PROCEDURES FOR USING LECIA DNA03 DIGITAL LEVEL
Revision Date: 6/07/05

FIRST Perform C-Test Do first of each day or at the beginning of a new project

From the "**Meas & Rec**" screen: Press the <**PROG**> key.

From the **"PROGRAMS"** screen, select <**4 CHECK & ADJUST**> then press the <**enter**> key.

From the **"CHECK & ADJUST"** screen, select <**1 Set Job**> then press the <**enter**> key.

From the **"SELECT JOB"** screen, select <**NEW**> then press the <**enter**> key.

From the **"NEW JOB"** screen, enter appropriate values as follows (Normally there will be one job file for each day. If a new project is started later in the day a second C-Test will be taken and job file created):

Job	:	***SASmmdds***	(initials of party chief, **m**onth, **d**ay, **s**ession A, B, C, etc.)
Oper	:	***SAS***	(initials of observer)
Cmtl	:	No entry - leave blank	
Cmt2	:	No entry - leave blank	

Highlight <**SET**>, then press the <**enter**> key.

From the **"CHECK & ADJUST"** screen, select <**2 SET METHOD**> then press the <**enter**> key.

From the **"SELECT METHOD"** screen, toggle "**Method**" to the following:

Method:	**A X X B,** or **A X B X**
Stf1:	No entry - leave blank
Stf2:	No entry - leave blank

From the **"CHECK & ADJUST"** screen, select <**3 START**> then press the <**enter**> key.

Follow prompts from screen to perform the chosen C-Test.

Note the "**Coll.err.new:**" value and record it with **sign** on the "Backup Recording Sheet."

Highlight <**SET**>, then press the <**enter**> key.

Do not set the Reticle unless observing optically using a calibrated rod with numerals.

SECOND First Section of the Day Start the Leveling Program

From the **"PROGRAMS"** screen, select <**2 LINE LEVELING**> then press the <**enter**> key.

From the **"LINE LEVELING"** screen, select <**2 SET LINE**> then press the <**enter**> key.

From the **"ACTUAL LINE"** screen, select <**NEW**> then press the <**enter**> key.

From the **"NEW LINE"** screen, enter the following:

(A new line name will be created for every section; SPSN = Specific Station Number)

Name	:	***10011002***	(From SPSN # to SPSN #; i.e., 1001 to 1002)
Meth	:	**BF**	(Always BF, backsight-foresight)
PtID	:	***1001***	(From starting SPSN #)
H0	:	**0.00000 m**	(Elevation at "From" Station **always 0.00000 m**)
Stf1	:	No entry - leave blank	
Stf2	:	No entry - leave blank	

Highlight <**SET**>, then press the <**enter**> key.

From the "**LINE LEVELING**" screen, select <**3 Set Tolerances**> then press the <**enter**> key.

From the **"SET TOLERANCES"** screen, select <**VALUE**> then press the <**enter**> key.

From the **"ENTER TOLERANCES"** screen, enter the following:

DistBal :	**5.00** m	(Accumulated BF imbalance)
MaxDist :	**60.00** m	(Maximum sight length)
StafLow :	**0.50** m	(Lowest reading allowed on rod)

Highlight <**SET**>, then press the <**enter**> key.

From the **"SET TOLERANCES"** screen, toggle the following:

DistBal :	**On**	(Accumulated BF imbalance activated)
MaxDist :	**On**	(Maximum sight length activated)
StafLow :	**On**	(Lowest reading allowed on rod activated)

Highlight <**SET**>, then press the <**enter**> key.

From the "**LINE LEVELING**" screen, select <**4 START**> then press the <**enter**> key.

Verify the "**CHECK LIST**" screen, select <**OK**> then press the <**enter**> key.

At this point the **"LINE LEV"** screen will be displayed.

Press the <**SHIFT**>< **USER**> keys, select <**3 CODE**>

From the **"CODE & ATTR ENTRY"** screen, key in the following

Code:	**1**	(Code number identifier – Start of day/Equip. change)
Info1:	***060705***	(Information Block 1 – Date mmddyy)
Info2:	***3***	(Information Block 2 – Observer number)
Info3:	**DNA03**	(Information Block 3 – Instrument type)
Info4:	**0**	(Information Block 4 – Temp. 0 = C; 1 = F)

Highlight <**REC**>, then press the <**enter**> key.

Press the <**SHIFT**>< **USER**> keys, select <**3 CODE**>

From the **"CODE & ATTR ENTRY"** screen, key in the following

Code: **2** (Code number identifier – Start of day/Equip. change)
Info1: ***332296*** (Information Block 1 – Instrument S/N)
Info2: ***-25*** (Information Block 2 – Collimation with sign; no decimal point)
Info3: ***26685*** (Information Block 3 – Rod #1 S/N)
Info4: ***26686*** (Information Block 4 – Rod #2 S/N)

Highlight <**REC**>, then press the <**enter**> key.

The Section is ready to begin – ready to take first measurement.

Press the <**SHIFT**>< **USER**> keys, select <**3 CODE**>

From the **"CODE & ATTR ENTRY"** screen, key in the following

Code: **11** (Code number identifier – Beginning Section Information)
Info1: ***0958*** (Information Block 1 – Time, 24 hr; hhmm)
Info2: **1** (Information Block 2 – Rod # on mark)
Info3: ***293*** (Information Block 3 – Starting temperature, no decimal point)
Info4: No entry -leave blank

Highlight <**REC**>, then press the <**enter**> key.

Point instrument at Backsight, focus, press <**Measurement Button**>, monitor standard deviation, etc.

Point instrument at Foresight, focus, press <**Measurement Button**>, monitor standard deviation, etc.

When setup is complete and acceptable, tell back rod person to move forward for next setup.

Press the <**SHIFT**>< **USER**> keys, select <**3 CODE**>

From the **"CODE & ATTR ENTRY"** screen, key in the following

Code: **33** (Code number identifier – Thermistor readings)
Info1: ***292*** (Information Block 1 – Bottom probe; no decimal point)
Info2: ***291*** (Information Block 2 – Top probe; no decimal point)
Info3: No entry -leave blank
Info4: No entry -leave blank

Highlight <**REC**>, then press the <**enter**> key.

Move instrument to next setup location. Repeat steps until ending bench mark is reached.

Point instrument at Backsight, focus, press <**Measurement Button**>, monitor standard deviation, etc.

Point instrument at Foresight, focus, press <**Measurement Button**>, monitor standard deviation, etc.

When setup is complete and acceptable, tell back rod person to move forward for next setup.

Press the <**SHIFT**>< **USER**> keys, select <**3 CODE**>

From the **"CODE & ATTR ENTRY"** screen, key in the following

Code: **33** (Code number identifier – Thermistor readings)
Info1: ***294*** (Information Block 1 – Bottom probe; no decimal point)
Info2: ***292*** (Information Block 2 – Top probe; no decimal point)
Info3: No entry -leave blank
Info4: No entry -leave blank

Highlight <**REC**>, then press the <**enter**> key.

- Repeat -

- Repeat, etc. – until last setup.

Move instrument to last setup location (turning into ending bench mark).

Point instrument at Backsight, focus, press <**Measurement Button**>, monitor standard deviation, etc.

Note: Before measuring last Foresight on the ending bench mark.

Press <**SHIFT**><**USER**> keys then select <**4 PtID & INCREMENT**> key

From the **"PtID & INCREMENT"** screen.

Running PtID
PtID: ***1002*** (Enter ending SPSN#)
Incr: **1** (Setup numbering increment; leave as 1)

Highlight <**SET**>, then press the <**enter**> key.

Point instrument at Foresight, focus, press <**Measurement Button**>, monitor standard deviation, etc.

When setup is complete and acceptable, tell back rod person to move forward for next section.

Press the <**SHIFT**>< **USER**> keys, select <**3 CODE**>

From the **"CODE & ATTR ENTRY"** screen, key in the following

Code: **33** (Code number identifier – Thermistor readings)
Info1: ***294*** (Information Block 1 – Bottom probe; no decimal point)
Info2: ***292*** (Information Block 2 – Top probe; no decimal point)
Info3: No entry -leave blank
Info4: No entry -leave blank

Highlight <**REC**>, then press the <**enter**> key.

The Section is ready to end – after last thermister recording.

Press the <**SHIFT**>< **USER**> keys, select <**3 CODE**>

From the **"CODE & ATTR ENTRY"** screen, key in the following

Code: **99** (Code number identifier – Ending Section Information)

Info1: ***1055*** (Information Block 1 – Time, 24 hr; hhmm)
Info2: **1** (Information Block 2 – Rod # on mark)
Info3: ***293*** (Information Block 3 – Ending temperature, no decimal point)
Info4: ***12*** (Information Block 4 – Wind and Sun codes; partly cloudy./sunny)

Highlight <**REC**>, then press the <**enter**> key.

Record **"Section Observation Information"** on **"Backup Recording Sheet."**

From the **"LINE LEV"** screen, record:

DBal: ***-23*** (Section accumulated imbalance with sign)
DTot: ***1265.43*** m (Total Section distance in meters)

Highlight <**LAST**>, then press the <**enter**> key to enter last setup measurement screen.

H: ***-12.12345*** m (Elevation difference with sign between starting and ending marks)

Highlight <**CONT**>, then press the <**enter**> key to return to main **"LINE LEV"** screen..

Highlight <**QUIT**>, then press the <**enter**> key.

This ends the Section.

<u>The Next and Subsequent Sections in the Same Day</u>

From the **"PROGRAMS"** screen, select <**2 LINE LEVELING**> then press the <**enter**> key.

From the **"LINE LEVELING"** screen, select <**2 SET LINE**> then press the <**enter**> key.

From the **"ACTUAL LINE"** screen, select <**NEW**> then press the <**enter**> key.

From the **"NEW LINE"** screen, enter the following:
(A new line name will be created for every section; SPSN = Specific Station Number)

Name : ***10021003*** (From SPSN # to SPSN #; i.e., 1002 to 1003)
Meth : **BF** (Always BF, backsight-foresight)
PtID : ***1002*** (From starting SPSN #)
H0 : **0.00000 m** (Elevation at "From" Station **always 0.00000 m**)
Stf1 : No entry - leave blank
Stf2 : No entry - leave blank

Highlight <**SET**>, then press the <**enter**> key.

From the "**LINE LEVELING**" screen, select <**3 Set Tolerances**> then press the <**enter**> key.

From the **"SET TOLERANCES"** screen, confirm the following:

DistBal : **On** (Accumulated BF imbalance activated)
MaxDist : **On** (Maximum sight length activated)
StafLow : **On** (Lowest reading allowed on rod activated)

Highlight **<SET>**, then press the **<enter>** key.

From the "**LINE LEVELING**" screen, select **<4 START>** then press the **<enter>** key.

Verify the "**CHECK LIST**" screen, select **<OK>** then press the **<enter>** key.

At this point the **"LINE LEV"** screen will be displayed.

Press the **<SHIFT>< USER>** keys, select **<3 CODE>**

From the **"CODE & ATTR ENTRY"** screen, key in the following

Code:	**11**	(Code number identifier – Beginning Section Information)
Info1:	***1102***	(Information Block 1 – Time, 24 hr; hhmm)
Info2:	**1**	(Information Block 2 – Rod # on mark)
Info3:	***301***	(Information Block 3 – Starting temperature, no decimal point)
Info4:	No entry -leave blank	

Highlight **<REC>**, then press the **<enter>** key.

Press **<SHIFT><USER>** keys, select **<4 PtID & INCREMENT>** key then press the **<enter>** key.

From the **"PtID & INCREMENT"** screen,

Running PtID		
PtID:	***1***	(Enter first Foresight number as 1)
Incr:	**1**	(Setup numbering increment; leave as 1)

Highlight **<SET>**, then press the **<enter>** key.

Point instrument at Foresight, focus, press **<Measurement Button>**, monitor standard deviation, etc.

When setup is complete and acceptable, tell back rod person to move forward for next section.

Press the **<SHIFT>< USER>** keys, select **<3 CODE>**

From the **"CODE & ATTR ENTRY"** screen, key in the following

Code:	**33**	(Code number identifier – Thermistor readings)
Info1:	***294***	(Information Block 1 – Bottom probe; no decimal point)
Info2:	***292***	(Information Block 2 – Top probe; no decimal point)
Info3:	No entry -leave blank	
Info4:	No entry -leave blank	

Highlight **<REC>**, then press the **<enter>** key.

Move instrument to next setup location. Repeat steps until ending bench mark is reached.

Continue as in starting Section following previous steps through the ending setup.

End of Day or Change in Observer or Equipment

Press the **<SHIFT>< USER>** keys, select **<3 CODE>**

From the **"CODE & ATTR ENTRY"** screen, key in the following

Code:	**9999** (Code number identifier – End of day/change in observer or equip.)
Info1:	No entry -leave blank
Info2:	No entry -leave blank
Info3:	No entry -leave blank
Info4:	No entry -leave blank

Highlight **<REC>**, then press the **<enter>** key.

Codes and Information Blocks

Anytime while in the leveling routine one can enter a code block into the job data file. Codes are entered by pressing the **<SHIFT>< USER>** key then selecting **<3 CODE>** (the **"Code"** function can be assigned to the USER key). Enter the code number and the appropriate information for the code. There are 4 information blocks to fill in for each code. If there is no entry required simply press the **<enter>** key to move to the next field. Once finished, select **<REC>** and press the **<enter>** key to record the data and return to the "**LINE LEV**" screen.

The codes will be entered as follows:

Code 1	Entered at the beginning of the day, change in observer, or change in instrument
Code 2	Inserted at the beginning of the day or change in level or rods
Code 11	Inserted at the beginning of a section
Code 22	Will reject the previous backsight and foresight
Code 33	Temperature code inserted after each set-up if recording gradient temperatures
Code 99	Inserted at the end of a section
Code 9999	Inserted at the end of day or for change of observer or equipment

LEVEL CODES

CODE 1 Beginning of Day or Change in Observer/Instrument Type

Info 1	Date (mmddyy)	
Info 2	Observer's Number	(1, 2, 3, etc)
Info 3	Instrument Type	(NA2002, NA3003, DNA03, etc)
Info 4	Temperature Code	(0 for C or 1 for F)

CODE 2 Equipment Used (Always accompanies a Code 1)

Info 1	Instrument Serial Number	(like 90810)
Info 2	C Test Error in Seconds of Arc	(no decimal, like –58 for –5.8)
Info 3	Rod 1 Serial Number	(like 25458)
Info 4	Rod 2 Serial Number	(like 25534)

CODE 11 Start of Leveling Section

Info 1	Start Time	(hhmm, 24 hour local)
Info 2	Rod on mark	(1 or 2)
Info 3	Starting Temp at Instrument	(no decimal, key 750 for 75.0 F)
Info 4	No entry – leave blank	

CODE 22 Reject Previous Backsight and Foresight

Info 1	No entry– leave blank
Info 2	No entry– leave blank
Info 3	No entry– leave blank
Info 4	No entry– leave blank

CODE 33 Temperature Gradient (Taken after each complete BF setup)

Info 1	Lower Probe	(no decimal, key 281 for 28.1 C)
Info 2	Upper Probe	(no decimal, key 281 for 28.1 C)
Info 3	No entry– leave blank	
Info 4	No entry– leave blank	

CODE 99 End of Leveling Section

Info 1	Ending Time	(hhmm, 24 hour local)
Info 2	Rod on mark	(1 or 2)
Info 3	Ending Temp at Instrument	(no decimal, key 750 for 75.0 F)
Info 4	Wind & Sun Code	(00 = Calm/Cloudy; 12 = Breezy/Sunny, etc.)

Wind Code:

0 – Calm	Wind speed averaged less than 6 mph during section
1 – Breezy	Wind speed averaged 6 to 15 mph during section
2 – Windy	Wind speed averaged greater than 15 mph during section

Sun Code:

0 – Cloudy	Less than 25% of setups are performed in sunny conditions
1 – Partly Cloudy	25 to 75% of setups are performed in sunny conditions
2 – Sunny	More than75 % of setups are performed in sunny conditions

CODE 9999 End of Day or Change of Observer or Change of Equipment

Info 1	No entry - leave blank
Info 2	No entry - leave blank
Info 3	No entry - leave blank
Info 4	No entry - leave blank

At this point the **"LINE LEV"** screen will be displayed. Begin each day or change of observer or equipment with a **Code 1** and **Code 2** and required **Info Blocks**. Begin each section with a **Code 11** and required **Info Blocks**. End each section with a **Code 99** and required **Info Blocks**. End each day or signal a change of observer or equipment with a **Code 9999** and no **Info Block** entries.

Note for Last Setup: On the last set-up for each section, key in the ending SPSN # of the mark leveled to **before measuring the last Foresight.** Press **<SHIFT><USER>** keys then select **<4 PtID & INCREMENT>** key to enter the **"PtID & INCREMENT"** screen. Enter the ending SPSN# in the **"PtID:"** line, leave **"Incr:"** line as 1 then select **<SET>** then press the **<enter>** key. Then measure the last Foresight.

At the end of each section, write down the pertinent "**Section Observation Information**" in the appropriate spaces on the **"Backup Recording Sheet." "DBal:"** = Accumulated imbalance; **"DTot:"** = Total Distance; select **<LAST>** to view **"H:"** = Elevation difference between starting and ending station. Note the number of **setups** when changing last Foresight PtID. After ALL "**Section Observation Information**" has been recorded select **<QUIT>** then press the **<enter>** key to end the section.

To begin the next section repeat the previous steps starting with the **"PROGRAMS"** screen, select **<2 LINE LEVELING>** then press the **<enter>** key. Use the same <1 Set JOB>, **set a new <2 Set Line> with new section information**, use same <3 Set Tolerances>, then **<4 Start>**.

Enter a **Code 11** and required **Info Blocks** for the beginning of the section.

At this point the **"PtID & INCREMENT"** numbering must be changed back to **PtID: = 1** or the point numbers will keep adding to the last entered SPSN#. Press **<SHIFT><USER>** keys then select **<4 PtID & INCREMENT>** key to enter the **"PtID & INCREMENT"** screen. Enter a 1 in the **"PtID:"** line, leave **"Incr:"** line as 1 then select **<SET>** and press the **<enter>** key. Then measure the first Backsight or Foresight wherever in the first measurement the point ID was changed - before or after the first Backsight – both work to change the first Foresight to PtID 1.

Enter a **Code 99** and required **Info Blocks** for the ending of the section.